UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,652	11/21/2003	Young-Il Cho	1572.1182	9121

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EXAMINER
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ART UNIT	PAPER NUMBER
3623	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
	10/717,652	CHO, YOUNG-IL
Office Action Summary	Examiner	Art Unit	
	SCOTT L. JARRETT	3623	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>21 November 2003</u>.

2a)☐ This action is FINAL.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-21</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-21</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>21 November 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☒ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>11/13/06, 11/21/03</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   This Non-Final Office Action is in response to Applicant's submission filed

November 21, 2003. Currently Claims 1-23 are pending.

Priority

2.   Acknowledgment is made of applicant's claim for foreign priority based on an

application filed in Republic of Korea on February 10, 200. It is noted, however, that

applicant has not filed a certified copy of the 2003-8273 application as required by 35

U.S.C. 119(b).

Title

3.   The title of the invention is not descriptive. A new title is required that is clearly

indicative of the invention to which the claims are directed.

        The following title is suggested: Transportation System and Method for Route

Planning and Job Assignment to Vehicles Moving in Opposite Directions.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1-2, 7-9 and 14-21 are rejected under 35 U.S.C. 102(b) as being

anticipated by Lee et al., A Real Time Traffic Control Scheme for a Multiple AGV

System (1995).

        Regarding Claims 1, 7, 17-19 and 21 Lee et al. teach a transport system and

method for transporting an article along a transport route comprising (Abstract; Column

1, Algorithm 2, Page 1629):

        - transporting vehicles moving along the transportation route in opposite

directions on the transport route (i.e. bi-directional; Column 1, Paragraph 1, Page 1628;

Column 2, Section A, Page 1626; Figures 2, 6, 7);

        - receiving at least one job (order, task, load, etc.), calculating a transport time to

be taken when the transport vehicles in the transport route perform respective job via a

job assigning part (from external host; Column 2, Section A, Page 1627; Figures 1, 4,

5);

        - creating job assignment information to assign each job to a corresponding one

of the transport vehicles having a minimum transport time according to each job order

via a job assigning part (Column 2, Paragraph 1, Page 1627; Column 1, Algorithm 2,

Page 1629);

    - creating route search information, based on received the job assignment

information, by searching an optimum route having minimum transport time to be taken

when the transport vehicle assigned with the job travels from a starting to a target

position in opposite directions on the transportation route, via a route searching part

(Column 1, Paragraph 1, Page 1625; Column 2, Last Paragraph, Page 1626; Column 1,

Page 1627; Column 1, Paragraph 1, Page 1628; Column 1, Proposition 1, Page 1629;

Column 1, Step 3, Page 1629); and

    - updating the route search information by search routes in real time when the

transport vehicle travels (Column 2, Number 2, Page 1629; Column 2, Paragraph 3,

Page 1630; Figure 8); and

    - job order execution unit controlling the vehicle according to the job assignment

and route search information (traffic control; Column 1, Paragraph 2, Page 1626; Figure

1).

    Regarding Claim 2 Lee et al. teach a transport system and method wherein the

transport route comprises a predetermined reservation position (temporary staying

node) between the starting and target positions as a reserved section and the transport

vehicle travels from the starting position to the predetermined reservation position

(Column 2, Bullet 2, Page 1627; Column 1, Paragraph 1, Page 1628; Column 1,

Algorithm 1, Page 1628; Figures 4, 5, 7).

Regarding Claims 8-9 and 15 Lee et al. teach a transport system and method wherein the nodes include first/second nodes, the route comprises first/second/third sub-routes coupling the first/second nodes and the optimum route represents that one transport vehicle disposed on one of the nodes moves from the first/second node to the nearest (shortest) one of the sub-routes and/or between the starting and target position (links, paths, trajectory, candidates, etc.; Column 1, Paragraph 1, Page 1628; Figures 2-3, 5, 8, 10).

Regarding Claim 14 and 20 Lee et al. teach a transport system and method wherein one of the transport vehicles moves on the first/second/third sub-routes in the opposite direction (bidirectional; Column 1, Paragraph 1, Page 1628; Column 2, Section A, Page 1626; Figures 2, 6, 7).

Regarding Claim 16 Lee et al. teach a transport system and method wherein one of the transport vehicles does not move along another one of the (third) sub-routes other tan the one of the (third) sub-routes (Column 2, Bullet 2, Page 1627; Column 1, Paragraph 1, Page 1628; Column 1, Algorithm 1, Page 1628; Figures 4, 5, 7).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee

et al., A Real Time Traffic Control Scheme for a Multiple AGV System (1995) as applied

to claims 1-2 above, and further in view of Cheng, Edwin, Application of Operations

Research to the Design of Automated Vehicle Systems (1992-1993).

        Regarding Claim 3 Lee et al. teach a transport system and method wherein the

transport time includes: a traveling time from starting to target position (Column 2,

Section A, Page 1626; Figure 2); a section reservation time (segment, zone, time

window, etc.) of other ones of transport vehicles (Column 2, Bullet 2, Page 1627;

Column 1, Paragraph 1, Page 1628; Column 1, Algorithm 1, Page 1628; Figures 4, 5,

7); and an occupation time of the other transport vehicles (Column 2, Section A, Page

1627; Figures 4, 5).

        While working times of transportation systems/methods is old and very well

known Lee et al. does not expressly teach that the transport time includes working time

of the vehicle as claimed.

Cheng teaches that the transport time includes working time of the vehicle
(Column 2, Last Three Paragraphs, Page 25; Column 1, Paragraphs 2, 4-6, Page 27) in
an analogous art of transport systems for transporting an article along a transport route
for the purpose of selecting the shortest-time path.

Cheng further teaches a transport system for transporting an article along a
transport route comprising: transporting vehicles along the transport route in opposite
directions of the transport route (Column 1, Number 1, Page 29); reservation
time/positions (Column 2, Paragraph 5, Page 27); assigning jobs to vehicles based
minimum (shortest) transport time (Column 1, Number 3, Page 24; Column 1, Number
2, Page 25; Column 2, Number 1, Page 24); and assigning jobs to the nearest vehicle
(Column 2, Number 2, Page 24).

It would have been obvious to one skilled in the art at the time of the invention
that the transport system and method as taught by Lee et al. would have benefited from
including a plurality of well known and widely use 'time' accrued/encountered by
transportation vehicles moving along one or more transportation routes including but not
limited to working time in view of the teachings of Cheng; the resultant system/method
enabling users to include further details in the transportation time and subsequently
select the shortest-time path/route.

Regarding Claim 4 Lee et al. teach a transport system and method wherein the
route and traveling time comprising a sum of time calculated from distances between

the nodes (workstations, zones, segments, paths, lanes, route, etc.) from the starting to

the target position and speeds of transport vehicles between the nodes (Column 2,

Section A, Page 1626; Column 2, Number 2, Page 1628; Column 2, Section A, Page

1627).

Regarding Claims 5-6 Lee et al. does not expressly teach that the transport time

includes working time of the vehicle as claimed.

Cheng teaches that the transport working time of the vehicle includes times for to

load and/or unload the article; charging, error, or job order completed (Column 2, Last

Three Paragraphs, Page 25; Column 1, Paragraphs 2, 4-6, Page 27) in an analogous

art of transport systems for transporting an article along a transport route for the

purpose of selecting the shortest-time path.

It would have been obvious to one skilled in the art at the time of the invention

that the transport system and method as taught by Lee et al. would have benefited from

including a plurality of well known and widely use 'time' accrued/encountered by

transportation vehicles moving along one or more transportation routes including but not

limited to working time in view of the teachings of Cheng; the resultant system/method

the resultant system/method enabling users to include further details in the

transportation time and subsequently select the shortest-time path/route.

8.   Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Lee et al., A Real Time Traffic Control Scheme for a Multiple AGV System (1995) as

applied to claims 1-2 above, and further in view of Interrante et al., Active rescheduling

for automated guided vehicle systems (1994).

        Regarding Claim 10-12 Lee et al. teach a transport system and method

comprises a reserved section node that one of the transport vehicles moves using the

reserved node (lane, path, window, zone, segment, etc.; Column 2, Bullet 2, Page 1627;

Column 1, Paragraph 1, Page 1628; Column 1, Algorithm 1, Page 1628; Figures 4, 5, 7)

and a time taken when the one transport vehicle is disposed in the reserved section

(Column 2, Bullet 2, Page 1627; Column 1, Paragraph 1, Page 1628; Column 1,

Algorithm 1, Page 1628; Figures 4, 5, 7).

        While priority driven job assignment/dispatch rules are old and very well known

Lee et al. does not expressly teach that one of the other transport vehicles have priority

as claimed.

        Interrante et al. teach that one of the other transport vehicles have priority

(Column 1, Paragraphs 1-2, Page 90; Column 2, Last Bullet, Page 91) in an analogous

art of transport system for the purpose of ensuring critical and/or late (waiting) jobs are

assigned/transport to the next available job/transport vehicle (Column 2, Paragraph 3,

Page 89).

Interrante et al. further teach a transport system transporting an article from a start node to a target node along a transport route having nodes including start and target nodes comprising: transporting vehicles moving in opposite directions along the transport route (Column 2, Paragraph, 2, Page 89); assigning jobs/orders to vehicles using a plurality of assignment/dispatch rules/strategies including shortest time, nearest vehicle, etc. (Column 2, Paragraphs 1-3, Page 89; Column 2, Paragraph, 2 Page 90; Paragraph 3, Page 90); and real-time updating of scheduling/routing (Column 2, Last Paragraph, Page 90).

It would have been obvious to one skilled in the art at the time of the invention that the transport system and method as taught by Lee et al. would have benefited from including a priority in view of the teachings of Interrante et al.; the resultant system/method ensuring critical and/or late (waiting) jobs are assigned/transport to the next available job/transport vehicle (Interrante et al.,: Column 2, Paragraph 3, Page 89).

Regarding Claim 13 Lee et al. teach a transport system and method wherein the minimum transport time comprises a time taken when other transport vehicles occupies the nodes on the optimum route between the start and target nodes (Column 2, Section A, Page 1627; Figure 5) .

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Ho, U.S. Patent No. 6,754,634, teach a transportation system for transporting articles between nodes on a transport path comprising calculating travel/transport time including dwell and load/unload times at each node.

- Kim, The operation of an automated guided vehicle system in an manufacturing job shot (1991) teaches a transport system and method for assigning jobs to transport vehicles with the shortest-time paths wherein the vehicles travel in opposite directions (bidirectional).

- Huang, Load Volume considerations in the collision free route planning of material handling devices in FMS (1992), teach a transport system and method comprising assigning jobs to transport vehicles having the shortest-time route in bidirectional networks.

- Langevin et al., Dispatching, Routing, and Scheduling of Two Automated Guided Vehicles in a Flexible Manufacturing System (1996) teach a transport system and method for transporting an article along a route having start and target nodes in real-time.

- Bilge, AGV systems with multi-load carriers: basic issues and potential benefits (1997) teaches a transport system and method wherein job orders are assigned to transport vehicles having the shortest transport time traveling along a path comprising nodes in real-time.

- Qiu et al., Scheduling and routing algorithms for AGVs: a survey (2002),

teaches a plurality of well known transport system and methods.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to SCOTT L. JARRETT whose telephone number is

(571)272-7033. The examiner can normally be reached on Monday-Friday, 8:00AM -

5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Hafiz Tariq can be reached on (571) 272-6729. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Scott L Jarrett/
Primary Examiner, Art Unit 3623